



UNIVERSITY OF JOHANNESBURG
FACULTY OF EDUCATION
NOVEMBER EXAMINATION 2014

PROGRAMME: B Ed and PGCE
MODULE: SUBJECT METHODOLOGY: PHYSICAL SCIENCES
CODE: XPS0000/XPS0001
TIME: 3 hours
MARKS: 100
EXAMINER: Prof U Ramnarain
MODERATOR: Prof F Mundalamo (TUT)
(This paper consists of 4 pages)

INSTRUCTIONS:

1. Write your surname, initials, student number and all other information required on each answer book used. An additional answer book may be obtained from the invigilator when the first answer book is full.
2. There are eight (8) questions. Read each question carefully before answering it.
3. The assessment criteria are, amongst others, the following:
 - Demonstrate a thorough understanding of and insight into the relevant theory.
 - Illustrate the ability to apply theory in a practical way in real educational situations.
 - Show logical and critical argumentation and deductions.
 - Lay out the answer systematically and write in an appropriate style.

QUESTION 1

Reflection is a key element in teacher profession development. Over your school experience you were guided by your mentor teacher and lecturer in doing a reflection of the lessons taught. Based on this, identify aspects in your teaching that you have identified for development. Outline a strategy that you will adopt so that action will be taken to address these aspects.

(10)

QUESTION 2

Consider lesson outcomes in the three domains of learning.

Formulate an outcome for each of the following action words in each domain of Physical Sciences learning:

2.1 Cognitive (minds-on): define; explain; apply; differentiate; analyze (10)

2.2 Psychomotor (hands-on): observe; measure; design; (6)

2.3 Affective (hearts-on): propose; challenge (4)

(20)

QUESTION 3

Choose any topic in Physical Sciences and explain how you will address the following aspects when planning a lesson.

3.1 Focussing the attention of learners. (4)

3.2 Contextualizing your lesson so that the learners see “the big picture”. (3)

3.3 The type of questions you will ask learners in supporting the construction of ideas in this topic. Give examples of each question type for this lesson. (6)

(13)

QUESTION 4

Consider the following test item developed by David Schuster (2010) that investigates the pedagogical orientation of a science teacher.

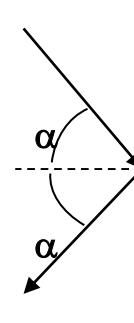
Ms. Baker is teaching her 8th grade students the law of reflection: when a ray of light strikes a mirrored surface, it leaves at the same angle as when it arrived. Ms. Baker has to decide how she will teach the lesson.

Thinking about your own teaching, of the following, which is most similar to how you would teach the lesson?

A. I would write the law of reflection on the board and illustrate with a diagram. Next I'd show them a real example, using a light ray source, mirror, and protractor. Then we would discuss any questions the students might have.

B. I would first pose a question about reflection for the students to explore. The students could investigate using light ray sources, mirrors, and protractors, and then discuss their findings. I would close the lesson by giving them a summary of the law of reflection.

C. I would ask students to find out what they can about light behavior around mirrors by



exploring on their own with an assortment of available items, including light ray sources, mirrors, and protractors. Then the students would report back on what they did and what they found out.

D. I would write the law of reflection on the board and illustrate with a diagram. Then I'd have the students verify the law using light ray sources, mirrors, and protractors. We would then discuss their findings.

4.1 Classify each of the above options according to the following pedagogical orientations: Direct didactic; direct interactive; guided inquiry; open discovery.

(4)

4.2 Think about how you would want to teach this lesson. Which approach would be **most inappropriate** to what you would use. Justify your answer.

(6)

(10)

QUESTION 5

Practical work in the form of science investigations plays an important role in Physical Sciences.

5.1 Discuss what is meant by a scientific investigation. (4)

5.2 From your experience of doing investigations, and also using it in your teaching, what are the learning benefits for learners. Explain how these benefits were evident to you. (6)

5.3 For each of the following investigations, identify the independent, dependent and control variables, and formulate a hypothesis.

5.3.1 Do all dishwashing detergents produce the same amount of bubbles?

5.3.2 How does the weight of a hanging object affect the length of an elastic?

(8)

(18)

QUESTION 6

6.1 Explain what is meant by Lee Shulman's conceptualization of pedagogical content knowledge (PCK). (4)

6.2 What is meant by an analogy? (2)

6.3 Use an example to explain how an inappropriate analogy can contribute to misunderstanding in science. (4)

(10)

QUESTION 7

- 7.1 Explain what is meant by a misconception in science. (2)
- 7.2 Give an example of a **common** learner misconception in chemistry (2)
- 7.3 Give an example of a **common** learner misconception in physics (2)
- 7.4 What strategies will you employ in addressing the above misconceptions in your class? (4)
- (10)**

QUESTION 8

Rubrics are described in the NCS and CAPS documents as 'a combination of rating codes and descriptions of standards'.

Design a 3 x 3 rubric for assessing the learner's ability to **conduct** a practical investigation in Physical Sciences. (9)

TOTAL: 100

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